FINAL REPORT

DESIGN ANALYSIS

FOR

ANAMORPHIC SYSTEM FOR HIGH POWER STEREOVIEWER

STAT

[redacted]

May 19, 1967

Approved For Release 2004/11/30 : CIA-RDP78B04770A000700010052-8

FINAL REPORT

DESIGN ANALYSIS

FOR

ANAMORPHIC SYSTEM FOR HIGH POWER STEREOVIEWER

Approved For Release 2004/11/30 : CIA-RDP78B04770A000700010052-8

ABSTRACT

The design Analysis phase of the contract for the Anamorphic System for the High Power Stereoviewer is completed and is presented in this Final Report

The design layout of the system is included and is described in detail.

Approved For Release 2004/11/30 : CIA-RDP78B04770A000700010052-8

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Figure

Approved For Release 2004/11/30 : CIA-RDP78B04770A000700010052-8

1.0 Introduction

This Final Report summarizes the work effort of the Design Analysis phase of the contract for the Anamorphic System for the High Power Stereoviewer. The work effort covers the period 27 January 1967 to 12 May 1967.

2.0 Optical System

The optical system for the anamorphic attachment for the High Power Stereo Viewer consists of an anamorphic prism zoom system and its associated spherical optics as shown in Figure 2-1. The figure is approximately 4x scale. The negative collimator doublet receives the light from the final relay of the High Power Stereo Viewer and renders it parallel. The variable prism anamorphic system, which requires collimated light, follows this doublet. This system consisting of four doublet prisms acts as a variable afocal anamorphic telescope. It provides continuously variable magnifications from 1.0 to 2.2x by rotation of the prism elements. The decollimator doublet lens which follows the zoom system forms the final image at the eyepiece focal plane. The field lens is used to prevent eyepiece vignetting while still permitting the system to be very compact.

The system replaces the final upper field lens assembly of the High Power Stereo viewer which is easily removed. The overall length of the system, from the existing relay lens of the Stereo Viewer to the eyepiece image plane, is nominally 108.5mm. This corresponds to an eyepoint increase over the normal Stereo Viewer of approximately 22mm. The system accepts the 6x and 10x [redacted] eyepieces as well as the [redacted] 10x wide field eyepieces. Eye relief with these eyepieces is identical to that

STAT STA

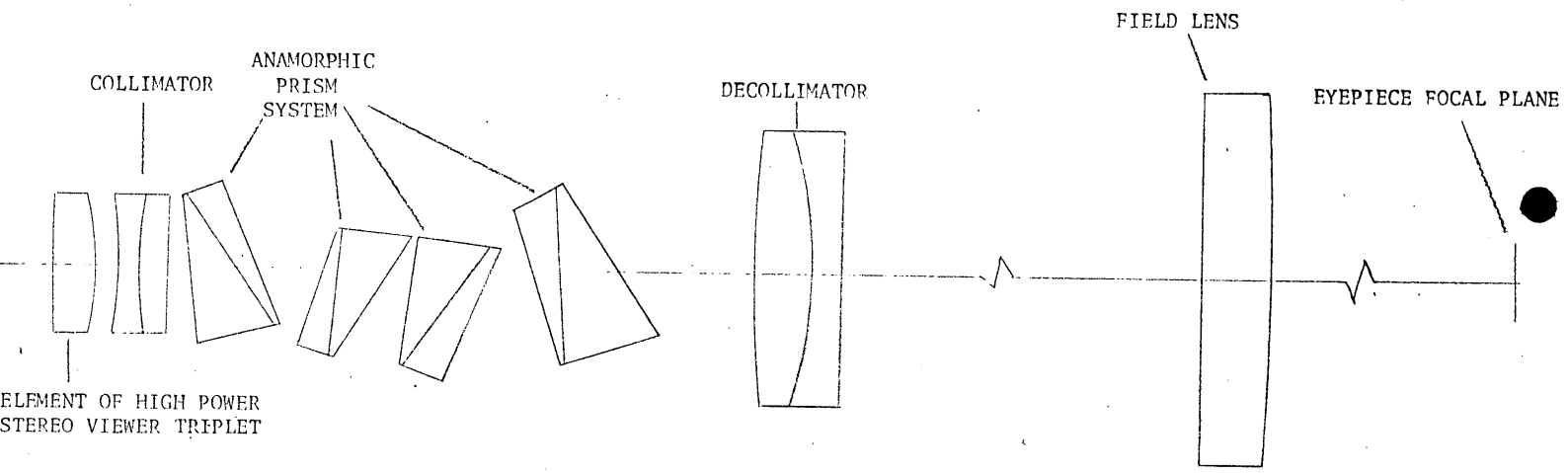


FIGURE 2 - OPTICAL SCHEMATIC OF HIGH POWER STEREOVIEWER ANAMORPHIC ATTACHMENT

when used on the High Power Stereo Viewer alone.

Adequate space is provided below the eyepiece image plane to assure accomodation of the longer [ ] eyepieces. STAT

Optical performance of the anamorphic attachment is essentially diffraction limited and does not reduce the overall performance of the High Power Stereo-Viewer with or without [ ] eyepieces and objectives. The relative insensitivity of the system to manufacturing variations assures that this performance will be achieved. There is no field reduction by the anamorphic attachment and the full useful field of the eyepiece is maintained throughout the zoom range of the High Power Stereo Viewer and the anamorphic attachment. The combination of the negative collimator and positive decollimator results in a complete cancellation of field curvature. The use of a slightly weaker field lens in place of the one in the High Power Stereo Viewer results in an overall flatter field for the system.

STAT

3.0 Mechanical System

Figures 3-1 and 3-2 found in the packet are mechanical design layouts of the prism bracket assemblies and anamorphic attachment respectively. These two drawings will be described in detail in section 3.1.

Section 3.2 describes the controls of the anamorphic attachment and Section 3.3 describes the method of attaching the anamorphic system to the High Power Stereoviewer.

3.1 Anamorphic Attachment Design Layouts

Figures 3-1 and 3-2, found in the packet at the end of this report, illustrate the prism-bracket assemblies and the design layout of the anamorphic attachment. The following paragraphs describe the parts called out on the two drawings. The description takes the parts as they would come in a mechanical assembly procedure.

The four prisms will be cemented to their respective brackets to obtain prism-bracket assemblies (1), (2), (3), and (4). These four assemblies will be positioned on their respective pivot points A, C, E and G., using pins set in an assembly fixture. Links (5), (6) and (7) will be attached to the pins of their respective brackets. The prisms, brackets and links become sub-assembly (19) which is inserted between the extensions of (21). Two pins each of (8) for pivot A, (9) for pivot C, (10) for pivot E., and (11) for pivot G

are inserted through the extensions of (21) into the respective prism-bracket assemblies (1), (2), (3), and (4). This arrangement becomes sub-assembly (20) which will be tested for anamorphic magnification at this stage of assembly.

(22) is slipped over (21) and bar assembly (25) is positioned so that the slot accepts pin (18). Sleeve (26) is slipped over (21) and (22) and these three parts are drilled and tapped to accept screw (28). (30) and (31) are screwed together, thereby capturing key (32) and thurst washers (33), (34), (35) and (36) as shown on each side of the flange of (22). The assembly is checked for proper running clearance.

The threads mating (30) and (31) are cemented. (30) and (31) are then drilled and tapped together to accept screw (54). (37) is screwed to (31). (38) is inserted between (22) and (31) with the slot in (38) accepting key (32). (39) is screwed to (22) to secure (38). Two thrust washers (40) and spacer (41) are positioned as illustrated, in (38). (42) is slipped over (22) and rotated so that the open ended cylindrical slot in (42) engages pin (24) of assembly (25). Two thrust washers (40) and spacer (41) are positioned as illustrated against the face of (42). (43) is screwed into (38).

Segment (44) is positioned inside (42) so that the open portion of (44) straddles the end of assembly (25).

The ends of the segment will be used as positive stops to prevent the bar assembly (25) from exceeding the anamorphic magnification range. Over travel of the magnification range must be prevented as it will cause the prisms to contact. The segment will be properly positioned and held in place with screw (45).

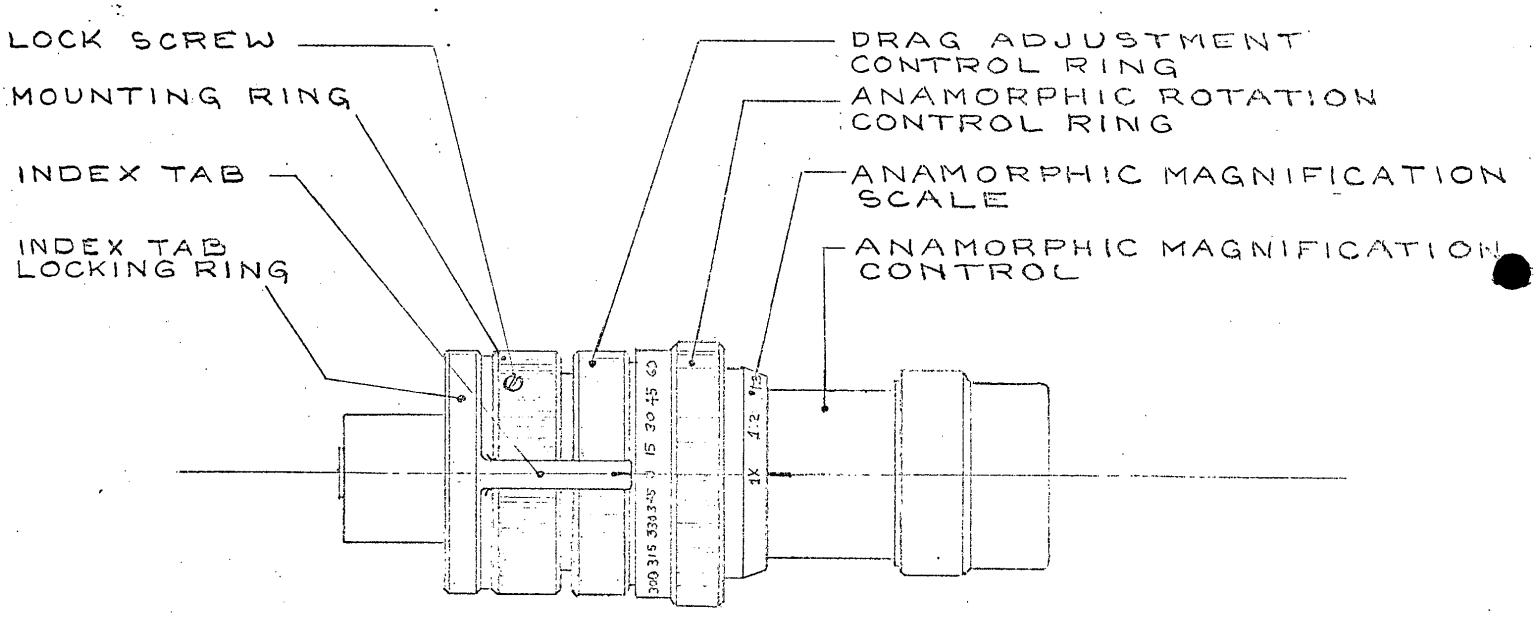
Lens assembly CD, the decollimator, is secured by retainer (29). (46) is positioned against (44). Sub-assembly (49) consisting of parts (47) and Lens E is screwed in place. (53) is slipped on (42) and (50) is screwed to (42). Index tab (51) may be located in any position with respect to (38) and secured by (52). The AB lens assembly is cemented in place. Lock screw (54) is inserted in (31).

3.2 Controls

The controls of the Anamorphic Attachment are illustrated in Figure 3-3. They are:

Anamorphic Magnification Control - Rotation of this control varies the anamorphic magnification. An index line on this control surface indicates the value of the anamorphic magnification.

Anamorphic Magnification Scale- The values of anamorphic magnification are engraved on the scale. The magnification values are given from 1.0x to 2.2x. Two sets of numbers will be engraved starting 180^{o} from one another in order to insure that at least one of the sets is visible after attachment of the anamorphic system to the High



CONTROLS OF ANAMORPHIC ATTACHMENT

FIG 3-3

Drag adjusting Ring - This control adjusts the tension on the anamorphic rotation ring. It can be positioned to lock the rotation ring.

Anamorphic Rotation Ring - Rotation of this control rotates the plane of anamorphism there-by allowing anamorphic correction to be introduced at any angle from 0^{o} to 360^{o}.

Index Tab - This tab may be positioned to indicate a reference position from which the rotation of the anamorphic prism cluster may be measured .

3.3 Attachment to High Power Stereoviewer

The upper field lens assembly of the High Power Stereoviewer is detached by unscrewing the upper half of the eyepiece tube. The anamorphic attachment is then screwed into place on the threads used by the eyepiece tube.

4.0 Summary

The design effort is completed and is described in this Final Report. The anamorphic prism zoom system used in the advanced anamorphic eyepiece for the Zoom 70 is used in this system. The mechanical means for tilting the prism required a new design because of the space limitations in the High Power Stereoviewer. The system as desiged is compact, easily attached and fulfills the design objectives of the proposal.

5.0 Contract Status

This Final Report describes the design analysis of Phase I of the contract. Is is now submitted for evaluation and approval. Upon receipt of approval Phase II will commence.

Approved For Release 2004/11/30 : CIA-RDP78B04770A000700010052-8

Next 2 Page(s) In Document Exempt